

Title: The Paint Experience

Brief Overview:

Students will explore the mathematical strands of measurement, problem solving, reasoning, number relationships, statistics, geometry, estimation, area, cost analysis, and communication while applying them to painting a house, a situation from real life.

Link to Standards:

- **Problem Solving** Students will use problem-solving approaches to investigate and understand mathematical content; formulate problems from situations within and outside mathematics; and verify and interpret results with respect to the original problem situation.
- **Communication** Students will reflect on and clarify their own thinking about mathematical ideas and situations; develop common understanding of mathematical ideas, including the role of definitions; discuss mathematical ideas and make conjectures and convincing arguments; and appreciate the value of mathematical notation and its role in the development of mathematical ideas.
- **Reasoning** Students will recognize and apply deductive and inductive reasoning; make and evaluate mathematical conjectures and arguments; and validate their own thinking.
- **Connections** Students will explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.
- **Number Relationships** Students will develop number sense for whole numbers; and understand and apply ratios.
- **Computation & Estimation** Students will compute with whole numbers; develop, analyze and explain procedures for computation and techniques for estimation; and use computation, estimation, and proportions to solve problems.
- **Statistics** Students will construct, read, and interpret tables and charts.
- **Geometry** Students will identify and classify geometric figures; represent and solve problems using geometric models; and understand and apply geometric properties and relationships.

- **Measurement** Students will extend their understanding of the process of measurement; understand the structure and use of systems of measurement; extend their understanding of the concept of area; and develop formulas and procedures for determining measures to solve problems.

Grade/Level:

This unit is designed for Grade 3, but it can be enhanced to include more advanced areas of computations for Grades 4 and 5.

Duration/Length:

The activities should take a minimum of 3 one-hour class periods to complete.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating amounts using whole numbers
- Measuring to the nearest centimeter
- Identifying and classifying geometric shapes
- Computing area of a rectangle and square
- Computing money values
- Computing ratios
- Computing using a calculator

Objectives:

Students will:

- identify polygonal shapes.
- measure to the nearest inch.
- recall and apply appropriate area formulas.
- determine area of a shape minus unrelated sections.
- use ratios to compare measurements.
- write to communicate, explain and support their answers and choices.
- use tables to calculate cost.
- complete tables with appropriate information.
- use calculator skills.

Materials/Resources/Printed Materials:

- Literature book
Oh, Were They Ever Happy
Peter Spier
Garden City, N.Y. Doubleday c 1978
- Pencils
- Standard inch ruler
- Chart paper
- Black board or overhead and appropriate writing material for item selected
- Student Worksheets 1- 8
- Teacher Resource Sheets 1-2

Development/Procedures:

Day 1: Students will be introduced to the steps involved in painting a house, constructing a list of materials and developing a step by step approach to completing the job through a literature based presentation followed by large and small group activities.

- Teacher will read orally literature book Oh, Were They Ever Happy by Peter Spier.
- Students will prepare, as a group, a list of materials that the Noonan children used in the story to complete their job and write it on the board or overhead.
- Teacher will lead a discussion about the process the Noonan children took to paint their house and how logical or illogical some of their methods were.
- Students will work in groups of 3 to 4 to construct a list showing a step by step procedure they could use to paint the outside of a house and write on chart paper.
- Groups will share procedures and orally explain why they chose their steps and the order in which they are organized.
- Student will complete a review of shape identification and related area formulas for items found within the room or at home. Use Student Resource, Page 1.

Day 2: Students will identify polygonal shapes, find the total surface area for the outside of a given house, communicate in writing how they have calculated their findings and appropriately complete a chart.

- Students will use Student Resources 2 - 4 to identify and record the polygonal shapes present in the drawings.
- Students will use a standard ruler to measure to the nearest inch and record on Student Resource 4 the base and height measurement of each of the polygonal shapes.

- Students will calculate the surface area of each separate polygonal shape and record on Student Resource 4.
- Students will calculate the total surface area covered by windows and doors and record on Student Resource 5.
- Students will convert the inch measurements using a given ratio to feet on Student Resources 4 and 5.
- Students will find total surface area of the outside of the house by using appropriate calculations in actual size and record on Student Resource 5.
- Students will explain in writing how they calculated the total surface area of the house to be painted and include a number sentence as part of their explanation on Student Resource 5.

Day 3: Students will estimate and calculate the amount of paint needed to complete the job from a given ratio, calculate the cost of the paint, construct a list of needed materials from a given chart with a set cost for the project and communicate in writing why they have chosen the items they have.

- Students will estimate the amount of paint required, explain their answer and state some of the variables they would have to consider when making their estimate and record on Student Resource 6.
- Students will calculate the actual amount of paint needed using a given ratio and record on Student Resource 6.
- Students will calculate the total cost of the paint needed to complete the job and record on Student Resource 7.
- Students will write an explanation including a number sentence to explain their calculations and record on Student Resource 8.
- Students will use a set amount of money and construct a list of materials from a given chart on Student Resource 7.
- Students will write a paragraph explaining why they chose the items they did on Student Resource 8.

Evaluation:

The teacher can use a variety of assessments to evaluate the students. First, participation in groups and as an individual can be assessed as participating or not. Second, Student Resources 1- 7 can be scored and graded for correct reasoning, estimating and mathematical computations. Finally, use the writing rubric to score all written responses within this task.

Extension/Follow Up:

- Construct a model of the house to scale and paint.
- Find a room within your building and follow a similar procedure to organize and complete a painting of an actual room.
- Write a letter to your principal persuading him/her to permit you to paint a room in your school.

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Student Resource #1

Find five objects in the classroom and complete the chart below.

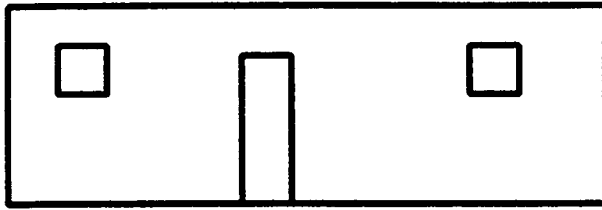
Object	Shape	Formula

Student Resource #1

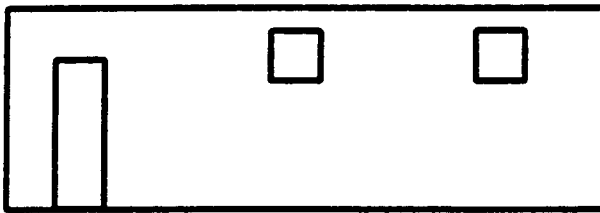
Find five objects in the classroom and complete the chart below.

Object	Shape	Formula

Student Resource #2

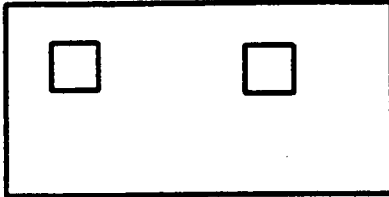


Front of the house

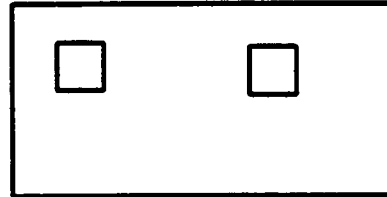


Back of the house

Student Resource # 3



Side 1 of the house



Side 2 of the house

Student Resource #4

Use Student Resources #2 and 3 to complete the table.

1 inch = 5 feet

Area Table

Part of house	Shape	Base inches feet	Height inches feet	Number sentence for calculating area in square feet	Area in square feet
Front					
Back					
Side 1					
Side 2					
				Total Surface Area =	

Student Resource #5

Part of the house	Shape	Base inches feet	Height inches feet	Number sentence for calculating area in square feet	Area in square feet
Door					
Window					

What is the total surface area covered by all the doors and windows on the house. Write the number sentence and explain your answer.

Calculate the total surface to be painted. Remember that you are not painting the doors and windows. Explain your answer.

Student Resource #6

Answer the following questions using the conversion below.

1 gallon of paint will cover 300 square feet

Estimate the amount of paint you will need. Explain how you made your estimate and include some of the variables that might affect the amount of paint you will need.

Calculate the amount of paint you will need. Write a number sentence and explain your answer.

Student Resource #7

You have \$125.00 to spend at the paint supply store. Choose the items you want and complete the chart below.

Materials List

Item for purchase	Cost
Paint	\$10.00 per gallon
Paintbrush	\$5.00
Apron	\$4.50
Paint roller and pan	\$9.75
Paint sprayer	\$40.99
Bucket	\$3.25
Plastic drop cloth	\$2.00 a piece
8 foot ladder	\$40.60
15 foot ladder	\$67.98

Materials Table

Item purchased	Quantity	Cost per item	Total cost
		Total =	

Student Resource #8

Write a paragraph explaining why you chose the items you did.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Teacher Resource #1

Writing Response Rubric

- 3** Student responds to all parts of question with complete, well-developed answers. Student uses information gained in activities to support their answers. Correct spelling, punctuation, grammar, and sentence structure are used.
- 2** Student responds to all parts of question, but answers are incomplete and not well-developed. Student's answers are only partially supported with information gained in activities. Few errors in spelling, punctuation, grammar, and sentence structure.
- 1** Student's response is incomplete and not supported with information gained in activities. Many errors in spelling, punctuation, grammar, and sentence structure.
- 0** No response.

Teacher Resource #2

1 inch = 5 feet

(Editor's Note: The measurements given in the table below do not match the actual measurements on Student Resources #2 and #3.)

Area Table

Part of house	Shape	Base inches feet	Height inches feet	Number sentence for calculating area in square feet	Area in square feet
Front	rectangle	6 in. 30 ft.	2 in. 10 ft.	$30 \times 10 =$	300 sq. ft.
Back	rectangle	6 in. 30 ft.	2 in. 10 ft.	$30 \times 10 =$	300 sq. ft.
Side 1	rectangle	4 in. 20 ft.	2 in. 10 ft.	$20 \times 10 =$	200 sq. ft.
Side 2	rectangle	4 in. 20 ft.	2 in. 10 ft.	$20 \times 10 =$	200 sq. ft.
				Total Surface Area =	1,000 sq. ft.

Part of the house	Shape	Base inches feet	Height inches feet	Number sentence for calculating area in square feet	Area in square feet
Door	rectangle	.5 in. 2.5 ft.	1.5 in. 7.5 ft.	$2.5 \times 7.5 =$	6.25 sq. ft.
Window	rectangle	.5 in. 2.5 ft.	.5 in. 2.5 ft.	$2.5 \times 2.5 =$	18.75 sq. ft.